Demonstration and Development of Amateur Radio Applications of Natural Vacuum Electronics

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Definitions

- Use of electron valves without enclosures
- Propagation of electron streams in the natural vacuum of the lunar or deep space environment
- Use of adjustable and deployable valve components: filaments, grids, plates, etc.

Beacon Station

- High Orbit or Lunar Surface
- Several stages of natural vacuum electron valves
- Transmits CW signal of several Watts
- Carrier signal with periodic CW identification

Amateur Radio Repeater

- Earth-facing side of the Lunar surface
- Earth-Moon-Earth relay of signals
- Solar powered
- Solar-heated cathodes
- Later generations - nuclear battery and radioactively heated cathodes

Manned Lunar Base

- High-power electron valves
- Variable geometry valve components
- Remote control operation in ambient lunar vacuum
- Backup communications for the lunar base

Large Volume Electron Valves

- Complete multi-valve radio station in a single volume of vacuum
- Multiple electron flows
- High power capacity
- Volumes of several cubic meters of vacuum
- Eventual applications: microwave power broadcasting, active SETI transmissions

Low Earth Orbit

- Higher concentration of molecules per unit volume
- Use of a wake shield to reduce concentration of molecules within electron valves

Required Skills for Development

- Vacuum tube design engineers (retired engineers)
- Physics experimenters (electron optics and particle acceleration experience)
- Metal working technologists
- Ceramics technologists
- Electronics engineers

Cost Factors

- High development costs if done commercially (component and circuit development)
- Long payback period
- Well-suited for interdisciplinary university and volunteer work
- Eventual high return

Eventual Reward

Natural vacuum electronics will be a valuable way to constructively use the vacuum of space.